# MONTANA *Wildlife*

MONTANA FISH AND GAME DEPARTMENT
OFFICIAL PUBLICATION

Digitized by the Internet Archive
in 2010 with funding from
Montana State Library

http://www.archive.org/details/montanawildlifejul1966mont

**STATE OF MONTANA**

**Governor—Tim Babcock**

**Montana**

**Fish and Game Commission**

| | |
|---|---|
| CHAIRMAN | E. G. Leipheimer, Jr., Butte |
| V. CHAIRMAN | Lyle H. Tauck, Hammond |
| MEMBERS | John T. Hanson, Sr., Malta |
| | W. E. Staves, Polson |
| | Robert H. Weintz, Great Falls |

**Department**

| | |
|---|---|
| DIRECTOR | Frank H. Dunkle |
| DEPUTY DIRECTOR | Keith A. Freseman |

**Division Chiefs**

| | |
|---|---|
| INFORMATION-EDUCATION | Richard Munro |
| FISHERIES MANAGEMENT | Arthur Whitney |
| GAME MANAGEMENT | Wynn Freeman |
| RECREATION PARKS | Wesley Woodgerd |
| LAW ENFORCEMENT | Orville Lewis |
| CHIEF CLERK | Bob Turnbull |

**Cover Picture**

**Anyone for a swim? By the time that autumn turns the leaves, these downy ducklings will be strong fliers—ready to join their kin as they flee south before winter's frigid blast.**

⁘ ⁘ ⁘

**SUBSCRIBERS—Please inform us when you have a change of address, otherwise your name will be removed from our mailing list.**

⁘ ⁘ ⁘

**Editor—Vernon Craig—July, 1966**

**CONTENTS**

| | Page |
|---|---|
| FLOATING THROUGH THE YELLOWSTONE WATERWAY | 2 |
| BLUE GROUSE LOVE LIFE | 13 |
| HOW MANY SERVICEBERRY = ONE DEER | 15 |
| BIG CHANGE IN THE BIG POND | 19 |
| THE BIG BLUE GROUSE | 23 |
| THE INTERNATIONAL ANTELOPE HERD | 28 |
| THE TEN POUND BROOK TROUT LIMIT | 31 |

# Floating Through the Yellowstone Waterway

By VERN CRAIG

With the river beneath and all heaven overhead, the fisherman or adventurous spirit needs little more for a pleasure-filled trip on the upper Yellowstone. The journey may be more satisfying still, if one knows of the river, the land from which its strength is drawn, and the people who first trod her wild reaches.

This land has been termed by some authors as one of the last American frontiers. It was here that the red men made their last ditch stands. Topping wrote "The Yellowstone country has been for many years the main battleground between civilization and barbarism."

We will attempt in this article not only to give an accounting of the recreation you may enjoy and to make suggestions for your personal comforts and safety, but also to offer a fleeting glimpse of this river and surrounding country as history recorded its events.

**The Yellowstone flows near Young's Point. It was in this vicinity where Captain Clark's party built two dugouts for down-river travel in 1806.**

## The River

The Yellowstone River originates in the cool green reaches of Yellowstone National Park. It courses some 440 miles before joining the Missouri River just across the Montana border in North Dakota.

Some Aborigines called this stream "Mi-tsi-a-da-z"—translated as Rock Yellow River. The name "Rock Yellow River" probably originated from the yellowish rimrocks and bluffs which are particularly evident along the river's lower course. Because of the great abundance of elk along it, the Crow Indians called it the Elk River.

The Yellowstone River system drains nearly 25 percent of Montana's land area. Its main tributaries are the Stillwater, Boulder, Shields, Clarks Fork, Big Horn, Tongue, and Powder Rivers. All except the Shields River flow in from the south.

Swift water is the rule for the upper river, for it drops from an elevation of 7,564 feet above sea level at Yellowstone Lake to 2,831 feet at the mouth of the Big Horn. From its source it runs through steep-walled canyons almost due north to its confluence with the Shields River. This is a most scenic spot with high mountain ranges appearing at nearly every point. To the south lie the Absarokas, to the west the Belts, to the northeast are the Crazy Mountains, and the Bridgers loom in the northwest.

From its juncture with the Shields River, the Yellowstone takes an eastward direction. The river bottom widens and benchlands dotted with cottonwoods, juniper, and scrubby ponderosa pine look down on the valley.

Water in the upper river runs clear and sparkling, but silt from tributaries burden it as it proceeds eastward. By the time the Bighorn and Powder Rivers have added their silty cargos, it seems almost a different stream.

### Fishing

The upper Yellowstone has been acclaimed by national sports writers as one of the top trout streams in the nation. The Montana Fish and Game Commission has proclaimed the length from the park boundary to Big Timber as a blue ribbon trout stream—one of the state's best.

We can thank our lucky stars that the upper Yellowstone is still free flowing, is relatively free of pollution and has a good water supply. These are the things which make it an outstanding trout stream and recreational stream.

In the blue ribbon section, rainbow and brown trout are abundant and there are some cutthroat. Brown trout dominate in the fishermen's creels. Four and five pounders are common and lunkers weighing over 20 pounds have been taken with rod and line. Whitefish are abundant also and are especially important to the winter fishery.

**The regal brown trout finds the upper Yellowstone much to its liking.**

Between Big Timber and Columbus, one can still find good trout fishing. The quality of the water begins to deteriorate, however, and trout are progressively harder to come by as one proceeds downstream. Below the mouth of the Clarks Fork, trout have given way to catfish, sauger, goldeye, and walleyes. Sauger fishing is excellent during late fall and early spring in the Huntley-Worden-Pompey's Pillar area. Suckers and carp are also common

residents in the lower stretches of the river.

### Catching Them

Sensitive souls are fishermen, so we're not going to get into trouble by telling them how to fish the Yellowstone. Each has his own techniques and his own pet lures, flies, or baits—so fishermen please accept the following as suggestions only.

The large size of the Yellowstone, the absence of impediments in most of the waterway, and a good water supply make this river a natural for float fishing. Fishing from the shore or by wading is productive also, but doesn't offer the ease of access enjoyed by floaters.

Cottus, a native forage fish, can be used as bait in any of Montana's open fishing waters. They are a good choice for taking larger trout. Sucker meat and worms are also dependable baits from spring to mid-summer, winter, and during the fall. Maggots and hellgrammites, taken from the river bottom, are preferred whitefish baits during fall and winter months.

Flies and lures are preferred over bait by most fishermen during mid-summer and fall.

Gold-colored spinners and gold or hammered brass spoons are good all-around bets, especially during early spring and late fall. Snow flies and other wet flies are productive early in the season, and dry flies come into their own about mid-May. Wet flies are generally best when fished on or near the stream bottom.

Bait fishermen should search out the deeper holes, debris piles and undercut banks. Fly fishermen might well work riffles and spots where shallow riffles break into deeper water. In the downstream portion of the river, sauger, catfish and ling provide good fishing. A daredevil type of lure, worms and sucker meat are the preferred enticements used by anglers to fill creels with these species.

### Your Float Trip

There are a number of points where you may put in or take out a boat. The Fish and Game Department is developing some access areas while towns along the river are also doing development. Camping areas will be provided at many of the access points for people who like to rough it. The less rugged individuals will find food and lodging at many nearby towns which border the Yellowstone.

Ideally, a float trip should begin up-river and terminate at a downstream point. Up-river trips can be made in powered boats, but the river is fairly swift and floaters will burn considerable gas pushing the current. Tackling an upstream journey by canoe may have been all in a day's work for rawhide-tough old timers, but most of today's paddlers will find the sweat and discomforts of fighting the currents very discouraging.

**Gear**—Whether a craft is to be paddled or power-driven, it's all important that floaters know how to handle all equipment, understand its capabilities, and be a competent operator of the boats before starting a trip. Men are essentially built for a landlubber's life, so precautions should be taken to cope with physical in-

**The canoe and kayak are still popular for river travel.**

**Pleasure boating on the Yellowstone River is not a new innovation as is evident from this old photo taken near Billings. (Photo through courtesy of Montana Historical Library.)**

adequacies we experience whenever we get out of our element.

Montana law requires that all boats be equipped with at least one life preserver for each boat occupant. They must be of a type approved by the U.S. Coast Guard, and each occupant who is twelve years old or younger must **wear** a life preserver when the boat is in motion. Information about other boating regulations may be had by writing to the Montana Fish and Game Department, Helena, Montana.

It's helpful when planning a boating jaunt to make a check list of the items needed, while planning a trip. This will help get everything aboard in the last minute rush. Just what boaters need, or want, depends on the length of the trip and their personal demands for comfort. In any event, a g o o d supply of drinking water should be aboard. Don't drink river water unless it's been adequately boiled or otherwise sterilized. Other suggested items for inclusion on check lists are: mosquito repellent, extra clothing in waterproof containers, sun glasses, a broad-brimmed hat or billed cap, raincoat (especially if the boat has no top,) a first-aid kit and extra shear pins. All clothing, bedding, food and other equipment which should not get wet should be carried in waterproof bags or boxes. Rubber bags of several sizes are available at most surplus and sporting stores. Surplus .30 and .50 caliber cartridge cans make excellent containers for valuables such as cameras, films, first-aid kits, etc.

It is suggested that most boaters, and certainly those without a lot of river experience, launch at some point below the mouth of Yankee Jim Canyon. At several points along the river, there are rocks, so be alert at all times. About four miles below Springdale, there is white water over a low weir. The weir is located in a south channel of the river near the end of a large island. Boaters should keep to the north channel here.

There is a large irrigation diversion near Huntley. Be alert for this obstacle and under no circumstances should one try to go over it. Land your boat and portage around the dam.

Always remember that the r i v e r is

rather swift. If persons do get caught where they have to swim, it's best not to fight the current, but swim at an angle with it toward the shore. Stay clear of debris, especially on the inside of bends and at other points where the current could possibly force a swimmer under or into partially submerged brush or logs.

**Both mule and whitetailed deer inhabit the area adjacent to the Yellowstone. (Photo by Danny On, U.S.F.S.)**

### Wildlife Along The River

Whitetailed and mule deer are common residents of the riverside. The mule deer will usually be found inside drainages and rough areas adjacent to the river. Whitetails secret themselves in the brushy bottomlands along the shore and on the islands.

Ringnecked pheasants will occasionally be flushed from the brushy shore areas, particularly in areas adjacent to grain fields. Though wild turkeys are not found immediate to the river, they inhabit pine hills south of Columbus.

A variety of waterfowl will be seen on and along the river. The mallard, or greenhead, and goldeneyes will be seen along most of the waterway. The anxious calls of Canada geese may greet you east of Billings in the Huntley-Worden-Custer area.

A great variety of small birds dwell and nest along the river, and great blue herons, perched stoically on one spindly leg, will stare quizzically at you from the river's edge.

The splash of beavers' flat tails can be heard up and down the river. Other small animals you might see will include mink, muskrats, and raccoons. Bobcats are numerous along the rougher breaks, but chances are you'll never see one.

### Early People Of The Area

The Yellowstone Valley is, in effect, an extended finger of the Great Plains. To the Indians it was a veritable horn of plenty. Buffalo swarmed the plains in massive, grunting herds. Elk, deer, and other game ranged the valley and benchlands, and grizzlies roamed as undisputed monarchs.

Apparently, the area was more or less accepted as a common hunting ground of Indians for a long time. Western tribes crossed the mountains into the Yellowstone to replenish their larder with buffalo. Smoke from the campfires of Snakes, Crows, Rees, Blackfeet, Piegans, Bloods, Gros Ventres, Flatheads, and Pend Oreilles mingled in the blue valley haze. Eventually, the Crows, who called themselves Absarokees, became the dominant power.

As white civilization advanced, the Sioux were gradually pressed westward into the Yellowstone area. The militant and better equipped Sioux drove most of the other Indians from the Yellowstone country, but the contests were bloody and the Crows clung doggedly to the land of their ancestors.

The uppermost Yellowstone was later occupied by a small band of "Sheepeaters" who seemed to be refugees from Shoshone and Bannack Indians. Even after the country had been more or less settled and other tribes had secured firearms, the Sheepeaters hunted with bows and arrows and dressed in animal skins. They were a diminutive, primitive people who must have undergone severe hardships while wringing a living from the high harsh mountain country. It is said that the Sheepeaters ". .. have traditions of swallowing up of most of their people by convulsions of the earth many centuries ago." One can but wonder if the

Indians were "swallowed up" during some gigantic quake or other spasm of the earth in the Yellowstone Park area.

### Then Came The White Eyes

Probably we will never know the name of the first non-Indian to set eyes on the upper Yellowstone, but certainly its whereabouts was known long before the famed expedition of Lewis and Clark in 1805-1806.

Some historians believe it possible that far-ranging Spanish explorers had visited the Yellowstone in the mid 1500's. David Thompson, an explorer and geographer, in 1797-98 had estimated the source of the Yellowstone and named it from information given him by the Mandan Indians.

Others may argue that the Verendrye party had trod the Yellowstone in the early 18th century. Some historians feel that Charles LeRays, a French Canadian, was the first white man to navigate the Yellowstone River as a prisoner of the Indians in 1802-1803. Antoine LaRocque, a representative of the Northwest Fur Company, was on the Yellowstone in 1805.

### Lewis And Clark

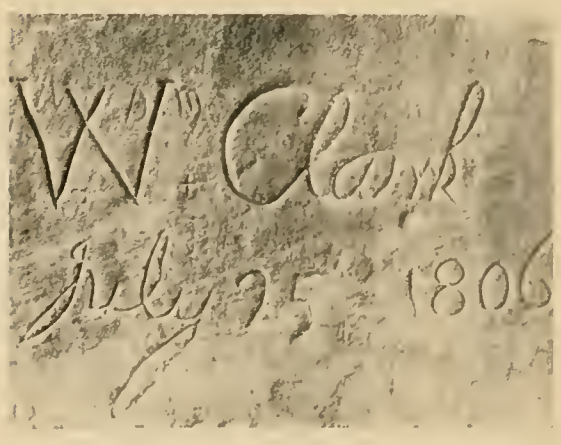
It is to the records of Lewis and Clark, however, that we must turn for first well recorded descriptions of the Yellowstone in its pristine setting. On his return trip to the east in 1806, Clark divided his party at the three forks of the Missouri. Clark himself continued overland with 25 men and several horses. They proceeded east, passing near or through the present site of Bozeman, and crossed the Bridger Mountains into the Yellowstone Valley. The first camp in the Yellowstone area was near the present site of Livingston on July 5, 1806.

With one of the party injured and horses sore-footed, Clark searched diligently for timber large enough to make dugout canoes. He was about two-thirds of the distance downriver between the present towns of Columbus and Laurel, and in the vicinity of Park City when he decided to use the trees at hand even

**Pompey's Pillar, a well-known landmark in the Yellowstone Valley, was named Pompey's Tower by Captain Clark. Clark found stone towers upon the pillars which had been placed there by the Indians.**

though they were not large enough for his liking. Two canoes were made from cottonwood trees. Each was about 28 feet long, 20 inches wide, and 18 inches deep. Right at this spot, the Crow Indians stole 24 of the party's horses. Somewhere above Pompey's Pillar, the remainder of the horses were stolen.

Clark gives the following account of the sighting of Pompey's Pillar: "I proceeded on after the (rain) lay a little and at 4 p.m. arrived at a remarkable rock situated in one extensive bottom on the Stard side of the river and 250 paces from it. This rock I ascended and from its top had a most extensive view in every direction. This rock which I shall call Pompey's Tower is 200 ...feet high and 400 paces in sercumpherance and only axessable on one side which is from the N.E. the other parts of it being perpendicular clift of lightish coloured gritty rock on the top there is a tolerable soil of about 5 or 6 feet thick covered with short grass. The Indians have made 2 piles of stone on the top of this tower. The natives have ingraved on the face of this rock the figures of animals near which I marked my name and the day of the month and the year . . ." The name of Clark still remains in the rock, reputedly the only remaining piece of handiwork left to the world by the famed explorer. Since the pillar marks the lower end of the Yellowstone Waterway, we shall leave the explorers at this point.




**The last remaining evidence of the Lewis and Clark expedition—Clark's name and the date engraved in Pompey's Pillar.**

### After Lewis And Clark

Even while Lewis and Clark were returning down-river from their long journey of exploration, John Colter, a member of their party who had taken leave of the expedition, was preparing to head back up the river with some trappers. John Colter was one of the great mountain men of the pioneer west. He is credited as being the first white to set eyes on the wonders of Yellowstone Park, and his hair-raising escapes among the Indians is a volume in itself.

Many trappers and traders plied the upper Yellowstone on the heels of Lewis and Clark. They carried out fortunes of beaver, otter, and mink. Unfortunately, most of these rugged men were illiterate, so most of their adventures and heroisms went unrecorded.

Trading posts where gun powder, clothing and other staples were exchanged for furs sprang up along the river. By the early 1820's, John Jacob Astor's "America Fur Company,' dominated the fur trade in that section.

A unique breed of men, sometimes described as more animal than man, were the early wolfers. The wolfers ranged the land trapping, shooting, and poisoning wolves, and doing some prospecting. Wolf pelts were not of much value until 1868, and the business of wolfing was not especially important until about 1870. During the early days, wolves were plentiful. Though some accounts tell of wolves which were primarily mountain inhabitants that packed together and moved onto the prairie during the winter, other accounts state that wolves were constant companions of prairie buffalo. Gaunt, gray spectres, they haunted the buffalo herds, stalking the stragglers, the weak and the unwary.

In the early 1860's, Yellowstone prospectors were doing a land-office business. Gold discoveries in the upper Yellowstone and in diggings further to the west created a lot of activity along the river and played

an important part in settlement of the Yellowstone Valley.

### Early River Traffic

Trade between the Yellowstone and Missouri Rivers was tied closely together; yet, even though the Yellowstone was one of the last areas in the northwest to be opened up, the Yellowstone never equaled the Missouri in steamboat traffic.

Indians commonly used bullboats on the Yellowstone. These were cup-shaped, cumbersome affairs made by stretching a green buffalo bull hide over a willow framework. Pirogues and keel-boats were used during the height of fur trade. Mackinaws and steamers finally followed.

The mackinaw and similar boats were probably the most used boats on the Yellowstone—at least by the whites. Mackinaws were usually built from 2" cottonwood planks. They were often 50 to 60 feet long, flat bottomed, and usually were sharp at both ends. The gunwales were about 3 feet above the water line, being higher at either end. They were sometimes referred to as flatboats, though the true flatboats were generally rectangular at both ends. These unwieldly crafts were meant for downstream use only.

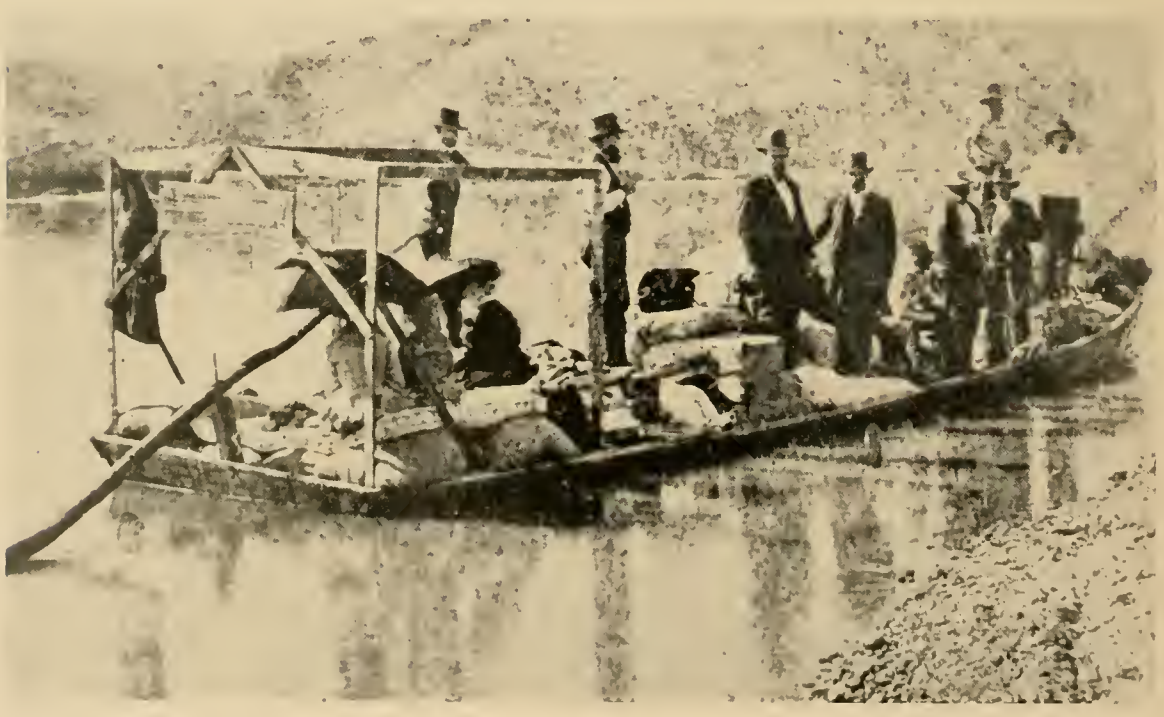
By the mid 1860's miners from Virginia City and Helena would cross over to the Yellowstone in numbers. They would depart from Benson's Landing (near the present site of Livingston) by mackinaw and float downriver to the nearest railroad. This was a period also which saw the beginning of pleasure expeditions down the Yellowstone. The head of navigation for the small boats was near Emigrant Gulch above Livingston. Water transportation was surprisingly rapid, as pointed out by J. Allen Hosmer who in 1865 traveled with a flotilla of boats from Emigrant Gulch to Iowa in 44 days. In 1886, 16 mackinaws carried 250 Virginia City gold miners 2,700 miles downriver in 28 days. The expedition was reported to have had $500,000 in gold dust aboard.

Even though regular boat tours were advertised out of Virginia City, with some accommodations for families, fear of In-

**The bull boat was made by stretching a buffalo hide over a crude framework of willows. (Photo courtesy of Montana Historical Library.)**

**Keel boats carried merchandise both upstream and down. They were pushed along by poles, sails, and also pulled with long ropes attached to the mast.**

**Mackinaws and flatboats were used primarily for down-river trips. The boat pictured here was laden to capacity. (Photos courtesy of Montana Historical Library.)**



dians kept river traffic to a minimum from 1867 to 1873. At this time, overland trails were also being established for the freighting of both cargo and people.

The useful mackinaws were used to transport items other than people as we see from the following account of Lieutenant James H. Bradley in 1876. Bradley was serving with General Gibbon's forces along the Yellowstone and recorded the following on Tuesday, May 23. "Colonel Chesnut, a Bozeman gentleman, arrived today in a mackinaw boat, bringing a cargo of vegetables, butter, eggs, tobacco, and other goods. He had a crew of four men and had made the run from Benson's Landing without seeing any Sioux or meeting with any misadventure. The luxuries he brought found ready sale and gave great satisfaction. Not the least acceptable article was a keg of beer, reserved for the officers and resulting in a convivial reunion in the evening at the tent of Lieutenants Hamilton and Schofield. It gave tongue to the hitherto voiceless eloquence, inspired to polemical contests of a racy sort, and put the voices of our singers once more in splendid tune. The time passed jollily, Colonel Chesnut was voted the best fellow going and the occasion will long be remembered as one of the greenest of the green spots in the campaign." Army life really hasn't changed much, has it?

### Steamboats

The mouth of the Bighorn River was considered to be the head of nearly all steamer navigation on the Yellowstone, so steamboat traffic was not an important part of the upper river traffic. Steamboats were first introduced to the river by the army who saw in them a possible solution to supply garrisons for the Indian campaigns. The earlier steamers were not built for the shallow waters and high winds of the Yellowstone. They have been described as "crude boats with one boiler, one engine, and uncountable mechanical difficulties."

By the 1840's the steamers had been considerably improved for shallow river travel. The famous Captain Grant Marsh came upriver in the "Josephine" to the present site of Billings on June 7, 1875. On July 6, 1879 he succeeded in landing 50 tons of freight at Huntley from the "Batchelor" for Bozeman consignees. These were the uppermost points of steamboat travel. Beginning in 1876, steamboat traffic on the lower river had increased considerably, but mackinaws and flatboats were still most important for bringing food and other supplies downriver to Indian campaigners.

Steamers, though not plying the upper river, certainly had their day in history. Aboard the steamer "Far West" the final details which ultimately led to the Custer massacre, were worked out between Generals Terry, Custer, and Gibbon. The steamer evacuated battle casualties and carried the news of the Custer disaster to the telegraph at Bismarck.

It was inevitable that the iron horse should ring down the curtain on the steamboats and most other river travel. The Northern Pacific was completed to Livingston in 1882, and soon usurped transportation. The advocates of river transportation died fighting, however. It had long been the dream of Bozeman people to develop the river travel, and as late as 1911 there was still promotion underway to provide a 4 foot channel in the river as far up as Billings with downstream locks to control water levels.

### Tales Of The Yellowstone

There are many authentic tales to be spun about bygone days of the Yellowstone—tales of bodies bristling with arrows, of brave feats and acts of infamy, of demon rum and men of the cloth. So many are the stories but space here will allow recounting only one.

In 1867-1868 a militia of 600 men were sent out to protect settlements of the Gallatin Valley. The party spent the winter at the mouth of the Shields River. The "Livingston Enterprise," September 8, 1888 tells the story. "Among the number

were many outlaws, renegades, horse thieves, and others who were too glad to seek shelter from the law by enrolling under its protection. As the winter went on, however, provisions commenced to get scarce. None were forthcoming from the governor, and no pay could be obtained. The vouchers issued by the territory were worthless. A mutinous spirit grew apace and raids on the commissary by hungry men became a daily occurrence. All discipline soon came to an end, and mutiny was in full sway. Whole squads of men deserted, taking with them what they could. Officers found themselves without men and many a member of the organization was killed in the numerous quarrels which pervaded the camp. . ." Thus it was, for some time after Livingston had become a town, a few lonely forgotten graves could still be found below the town. "Graves that marked the last camping grounds of some of Montana's first militia men."

**Annual Float Trip**

Recreational use of the Yellowstone is growing. There has been a healthy spirit of enthusiasm and cooperation among communities and persons along the river.

This will be the third year for an organized float trip down the Yellowstone. The annual event is a pleasure trip down the river from Livingston to Billings. This year the trip ran from July 8 through 12. It is sponsored by the Jaycees and mayors of cities along the floating route as a public service project.

There's no fee charged for participation, and everyone is welcome to join the fun. Last year, some 129 craft participated in the float and several states were represented. Meals are provided by service clubs along the route, and the cost is about $1.00 to $1.25 per person per meal. Floaters may do their own cooking at campsites if they wish. Transportation service is provided at overnight camps in order to transport people from the boat landing to the business district in town.

Pompey's Pillar was dedicated as a national monument following the float trip.

I hope that our brief visit will help you enjoy your outing. There's relaxation and good fishing to be had here. You'll find the townspeople along the way most anxious to help you out. They've done a lot to clean up the river and to help provide camping, picnicking and boat launching sites. If you've enjoyed yourself, then tell them so. Help by keeping the river and surrounding areas clean and free of litter. Hold a healthy respect for the river! Above all, enjoy yourself.

# TENDER TOUCH

By

JENNIE SENRUD HUTTON

TOUCH THIS LAND WITH GENTLE FINGERS,
DON'T SCRAPE HER DEEP FOR ALL SHE HOLDS,
KEEP HER GREEN AND BLOOMING COVER,
ITS FAR MORE RARE THAN YELLOW GOLD.

LEAVE THE LUSH AND VERDANT VALLEYS,
CUT NOT DOWN THE STATELY PINE,
THEY WILL GIVE OF PEACE AND BEAUTY,
TO THE LOVED ONES WE LEAVE BEHIND.

DON'T DESTROY WHAT GOD HAS GIVEN,
MIGHTY WORKS, A LOVING LAND,
TOUCH THE LAND WITH GENTLE FINGERS,
SHE'LL REPAY YOU WITH BOTH HANDS.

MRS. JENNIE HUTTON
Ekalaka, Montana

**Dressed in full courting regalia, this blue grouse male was lured in by tape recorded calls of female blues. (Photo by Bob Gilluly.)**

# Blue Grouse Love Life

By THOMAS W. MUSSEHL

In order to determine the relationship of man's activities such as hunting, pesticide-use, logging, and fire control on his favorite mountain game bird, the blue grouse and its habitat, we must have a thorough knowledge of the blue grouse's mating habits and behavior.

Blue grouse descend from higher wintering areas to lower elevations for mating and nesting. The cocks return annually in early April to breeding territories in semi-open stands of mixed-age timber. Second-year and older males defend the 1 to 2 acre territories against other males. Yearling males are generally driven away from the love-making areas by older cocks. Females are enticed to the cock territories by an elaborate series of hoots, wing-flutters, and gaudy feather displays.

Compared to the fall hunting period, blue grouse are relatively foolish during the spring courtship season. Grouse researchers have found that the courting blues often can be approached close enough to be captured with a 24-foot telescoping fish pole equipped with a noose. A new electronic innovation for locating and luring in the male grouse was recently developed by biologists at the University of British Columbia. The soft, alluring love call of the female grouse broadcast from a portable tape recorder has been effective in stimulating the males

**Showing little fear of man, "Goofy" becomes infuriated by his own image in a mirror. (Photo by Bob Gilluly.)**

into conspicuous courtship antics. A copy of the Canadian grouse love call has been nearly as effective on Montana blue grouse males. Captured grouse are individually marked with combinations of numbered leg bands and released. Many banded grouse are later identified by reading their leg bands with spotting scopes or binoculars.

The extreme fidelity of cocks in returning to their same breeding territories each spring makes it possible to check the survival of marked males from one year to the next. Newly matured cocks generally take over breeding sites vacated by the death of a predecessor. This behavior pattern is a key part of a grouse population study conducted in a popular grouse hunting area of the Bitterroot since 1962. The spring breeding population of banded "blues" has had only minor ups and downs despite high hunter interest and some poor hatches of young birds during the past five years. Survival of banded grouse is also providing a check on possible effects of experimental forest insecticides being tried on other areas of the Bitterroot National Forest.

Since 1957, blue grouse breeding territories have been located on study plots in several areas of Montana. The best blue grouse breeding populations have been found in 10 to 25 year old cut-over areas of Ponderosa pine and Douglas fir in western Montana. Breeding grouse are most abundant in mixed-age stands of trees with scattered openings and thickets or "edges" of regenerating conifer tree growth. Optimum habitat in the Bitterroot has been found to support up to 50 or 60 breeding cocks per square mile. Few breeders are found in large blocks of recent clear-cut areas or in dense, maturing stands of timber. The numbers of breeding niches available to blue grouse vary with changes in the forest canopy and stages of regenerative forest growth. Continued research will be aimed at evaluating the needs of blue grouse breeding habits and the relationship of past and present timber harvest methods.

# HOW MANY SERVICEBERRY = ONE DEER?

By L. JACK LYON

Dr. Lyon is a Wildlife Research Biologist and Leader of the Northern Rockie Forest Wildlife Habitat Project, Intermountain Forest and Range Experiment Station, U.S. Forest Service, Missoula.

When the snow is deep and the weather turns rough, there's nothing quite so satisfying as a belly full of serviceberry twigs—if you're a deer, that is. If you aren't a deer, serviceberry probably does not sound like much of a substitute for steak and potatoes. Nevertheless, for deer and deer hunter alike, **Amelanchier alnifolia** is an important plant. In food-habits studies, serviceberry is usually rated as an "ice-cream" food because the animals like it so well. On many ranges it is the key species that insures winter survival of Montana deer.

Last year we got to wondering how many plants it takes to supply the belly full of twigs that makes for a happy deer —or more important, how many plants it takes to keep a deer alive when the snow is 3 feet deep and it's forty below. This is a complicated question because serviceberry plants come in all sizes and shapes and no two deer are exactly alike. Obviously, there isn't any single answer, but the information we collected does supply at least a partial answer. Would you like to make a guess before you read the rest of this article?

### The shrub— how much does a serviceberry produce?

In the fall of 1964, we set out to determine just how much forage a serviceberry plant produces. The sample consisted of 110 plants on 11 different sites. Plants ranged from 18 inches to 12 feet in height and the sample areas were scattered over a wide variety of ranges. Ten plants, for example, were located on a sunny, south-facing slope above the South Fork of Petty Creek. Ten more were located on the west slope of Rattlesnake Creek near Missoula, and another 10 in the dense shade of a Douglas-fir stand near St. Regis. Overall, the sample was considered pretty much representative of serviceberry plants and the places they grow in western Montana.

After the growing season was over, the 1964 growth was clipped from all 110 plants with garden shears. Clipping was limited to those twigs over 1 cm. long, including the bud. The twigs from each plant were oven-dried and weighed. A summary of production for all plants is presented in table 1.

**Table 1. Grams of current annual growth, (oven dried) on 110 Western Montana serviceberry plants.**

| Area | Grams of Annual Growth | | |
|---|---|---|---|
| | Smallest plant | Largest plant | Average for 10 plants |
| 1. Garden Point, sunny slope | 0.2 | 349.1 | 46.1 |
| 2. Garden Point, shaded area | 0.1 | 56.0 | 9.5 |
| 3. Rattlesnake Cr., bottomland | 1.7 | 55.4 | 10.6 |
| 4. Rattlesnake Cr., open slope | 0.5 | 23.7 | 9.6 |
| 5. Spring Gulch, bottomland | 2.8 | 95.2 | 27.7 |
| 6. Schwartz Cr., ridgetop | 0.5 | 35.7 | 8.3 |
| 7. Cold Creek, flat bottomland | 0.1 | 53.1 | 25.3 |
| 8. Cold Creek, slope | 0.4 | 64.9 | 13.1 |
| 9. St. Regis, shaded bottomland | 0.8 | 52.7 | 11.6 |
| 10. Mitouer Gulch, shaded area | 0.8 | 33.8 | 11.7 |
| 11. Mitouer Gulch, logged area | 1.1 | 12.1 | 5.6 |
| AVERAGE FOR ALL PLANTS | | | 16.3 |

These data demonstrate some striking contrasts. The healthiest shrub which, incidentally, was not the largest, produced 349 grams of new twig growth; but the second most productive plant had only 95 grams. The overall average for 110 plants was 16.3 grams; but the two best plants in each sample produced a combined average of 52.1 grams while the two poorest plants had an average yield of only 1.3 grams. On one site, the total yield for all ten plants was only 56 grams of new growth.

Reduced to more meaningful terms, it takes nearly 28 of these "average" serviceberry plants to produce a pound of oven-dry twigs. If you just consider the two best plants in each sample, it requires 9 plants to produce a pound of serviceberry twigs. Clearly, a deer is going to have to visit a lot of plants to find that belly full!

### The belly full— how much does a deer need?

What, then, is a belly full? A number of studies of deer food requirements have been reported, and the results all point to about the same conclusion. Arizona deer can get along on about 2.2 pounds of air-dry native forage per day for a 100-pound deer. In Michigan, it takes 2.65, but the deer lose weight; and in Wisconsin 3.5-5.5 was reported as the proper figure. Closer to home, results of one study suggest that a 140-pound mule deer ought to have about 4-5 pounds of air-dry forage a day. Two researchers who did another study, consider 5 pounds a good average for deer in the rough terrain and deep snow of most western ranges. Oven-dry is a little lighter than air-dry, but 4 pounds of forage for a 150-pound Montana deer seems like a fair estimate.

How much is that? Well, as an aid to visualizing 4 pounds of serviceberry twigs, consider this: the average weight of a single twig was 222 milligrams. The average length was 95.68 mm. **A plant producing 16.3 grams of forage has over 23 feet of new growth, and 4 pounds of serviceberry twigs would stretch out nearly half a mile!**

### How many plants equal a belly full?

Eating 4 pounds of twigs a day, it appears that each deer will have to visit

**The clubbed shape of this serviceberry bough testifies to its heavy use over a number of years.**

111 serviceberry plants. Unfortunately, this is not the full story. Although there are plenty of winter ranges where every bit of the annual growth (and then some) is taken by deer, serviceberry just can't stand that kind of abuse indefinitely. In the long run, Montana range managers think 60 percent utilization is about the maximum the shrub will tolerate. Good management will keep the deer herd at a level which requires an average serviceberry to supply only 9.8 grams of forage out of the 16.3 produced. Our poor old deer is beginning to look well traveled. At 60 percent utilization he will have to visit 186 plants to get his 4 pounds of twigs!

In actual fact, it's unlikely that any deer really uses 186 serviceberry plants a day. Montana deer are smart enough to recognize that it just doesn't pay to look for lunch on a range where they ought to be carrying a sandwich in a packsack. Instead, you'll find them concentrated in places where 25 grams per plant is an average production figure. More than that, they'll probably ignore the little plants and concentrate on mature shrubs producing 45 grams or more. Even so, collecting a belly full of twigs is going to be quite a job. If only 60 percent of the annual growth is utilized, it takes about 67 mature serviceberry plants to feed a deer for one day.

### Management Implications

A little simple multiplication on this figure produces some pretty startling results. Eating the annual growth of 67 mature serviceberry shrubs a day, a deer requires nearly 25,000 plants each year. The astronomical number of mature shrubs required to support all of Montana's deer is neither believable nor possible, but it does lead to some important implications for the deer and for land managers interested in producing and maintaining deer habitat.

First, it seems obvious that Montana deer are going to have to settle for something less than serviceberry "ice cream"

for every meal. It simply would not be possible to devote enough land to this particular shrub to feed all the deer. No one has had an opportunity to check with the deer on this, of course, but it does seem unlikely that they would object. Food habits studies normally reveal a wide variety of plants in the diet, and there is considerable evidence that a mixed diet is necessary to maintain an animal in good health. In fact, feeding trials in Michigan have shown that deer do better on a mixture of browse plants than on any single browse species fed alone.

Second, the meat and potatoes portion of the deer diet is going to have to consist of plant species a little more productive than serviceberry. A number of studies have confirmed that this is possible. Investigators in California, for example, have found that a mature bitterbrush produces around 200 grams of leader growth in a year.

Finally, management favoring serviceberry should be considered more important on winter range areas than in summer habitat. Forbs and herbaceous material provide a significant proportion of the deer diet when there is no snow, but browse becomes critical when other plants are covered. Serviceberry may be the only food available when the snow is 3 feet deep and it's forty below: and any deer will tell you **that's** important.

Next time you're in the woods salute the lowly serviceberry. It may take 67 of them to provide a satisfying belly full—but where else can you get ice cream in 67 flavors in the dead of winter?

If you're interested in learning more about deer and their natural foods, here is some suggested reading.

Hubbard, Richard L., H. Reed Sanderson and

Dahlberg, Burton L. and Ralph C. Guettinger
1956. The white-tailed deer in Wisconsin. Wisconsin Conservation Department, Techn. Wildl. Bul. 14. 282 pp.

Davenport, LaVerne A.
1939. Results of deer feeding experiments at Cusino, Michigan. Trans. N. Amer. Wildl. Conf. 4:268-274.

Hill, Ralph R.
1956. Forage food habits, and range management of the mule deer. in Taylor, Walter P. The deer of North America. Harrisburg: The Stackpole Co. 393-414.

Hubbard, Richard L., H. Reed Sanderson and David Dunway
1960. Herbage production and carrying capacity of bitterbrush. Pacific SW Forest and aRnge Expt. Sta. Res. Note 157. 6 pp. mimeo.

Nichol, A. A.
1938. Experimental feeding of deer. University of Arizona, Agric. Expt. Sta. Tech. Bul. 75. 39 pp.

Schwan, H. E. and Lloyd Swift
1941. Forage inventory methods, with special reference to big game ranges. Trans. N. Amer. Wildl. Conf. 6:118-126.

# BIG Change in the BIG Pond

By JIM POSEWITZ

The 245,000 surface acres of Fort Peck Reservoir make it the largest body of water in Montana. Constructed in the '30's it was the first of the mainstem Missouri River impoundments which have come to be known as the "Great Lakes of the Missouri." Being the oldest of the Missouri River impoundments, it might be supposed that the fish populations of this reservoir would have reached some form of relative stability over the past thirty years with few changes to be expected. This, fortunately, is not the case, and eastern Montana anglers are beginning to enjoy some of the best angling in the reservoir's history. At the heart of this angling bonanza currently being enjoyed in Fort Peck are several groups of fast-growing, eager-eating northern pike —a fish that as far as most anglers were concerned did not exist in the reservoir prior to the ice fishing season of 1963 when some small northerns were taken. In fact, creel census reports available on 1,577 angler trips to Fort Peck Reservoir between 1952 and 1962 reported the taking of only 13 northern pike—quite a contrast to the present situation where 303 northerns have been taken between November 29 and December 24, 1965 from under Johnny's Marina alone.

**John Rognuss with a 23-lb. northern that he caught off the face of Fort Peck Dam during October, 1965. (Photo by U. S. Army Corps of Engineers.)**

**Fisheries biologists are shown using a beach seine in Fort Peck Reservoir. They are collecting young of the year in order to assess success of reproduction. Note the flooded vegetation.**

To determine what conditions developed in the reservoir that eventually resulted in the establishment of this northern pike population, we must first look at some of the basic requirements of the northerns themselves, and then observe how these requirements were finally met in Fort Peck Reservoir.

The Northern pike is not native to the waters of Montana and, consequently, we must look to studies conducted in other areas to determine what his requirements are in his native habitat. The first and foremost considerations with any fish population, of course, are conditions necessary for successful reproduction. In reviewing the work done on northern pike spawning habits in their native areas, we find that very early in the spring, shortly after the ice goes out or in some cases while the main lakes are still ice-bound, the northerns enter sloughs adjoining the lakes or marshy areas of the lakes themselves. The eggs are laid over the flooded aquatic vegetation. Fishery biologists also reported that the sight of suitable vegetation plus high and rising temperatures were the primary stimuli to egg deposition. They also noted that various species of aquatic sedges were preferred by the pike. It is in this first and very basic requirement that we can see what has been a major obstacle to the development of a pike population in Fort Peck for so many years, One of the characteristics of a fluctuation reservoir such as Fort Peck is the exposed mud flats in the spring as a result of the normal winter draw down. This annual fluctuation, the ups and downs in the water level, also prevented growths of emergent aquatic vegetation, such as the aquatic sedges, from establishing themselves along the shoreline; however, we shall see later that the northerns have also made some adjustments.

The key to the reproductive success of the northern pike then, has been to get the water of the reservoir onto some of the vegetation around the reservoir in the spring of the year and have a population of adult northern pike ready to go to work. To reconstruct how this was done, we will have to go back to 1954 and follow an abnormal water level fluctuation in Fort Peck Reservoir and try and relate it to the northern pike's requirements. First, we must assume there were few, if any, northerns present when the reservoir was first filled, for as the water level came up for the first time, several

hundred thousand acres of vegetation were flooded, and there was ample opportunity for development of pike populations if a brood stock were present. This did not occur and the early fishing was for crappie, perch and sauger. After the reservior was once filled, the fishing gradually deteriorated as the reservoir became older. Over the years, most fish known to fish culture were planted into the reservoir; however, little improvement in the general fishing was noted. It was probably during this trial and error period of fish planting that northerns first found their way into the reservoir.

In July of 1954, the first of what to be a long series of events occurred that would eventually lead to excellent fishing ten years later. This was the first of two severe draw downs which resulted in the level of the reservoir falling 58 feet between July of 1954 and January of 1956. This draw down was then followed by a gradual increase in the reservoir's water level that showed a gain of 49 feet between January of 1956 and July of 1960. Consequently, during the springs of 1957, 1958, 1959 and 1960, the water of the reservoir was rising over land that had been high and dry for, in some cases, several years. As a result, the northerns looking for spawning areas found flooded vegetation for the first time in many years. The northerns produced in the reservoir at this time failed to make any impact on the sport fishery. In fact, the only clue we have that northern pike were, in fact, produced in the reservoir at this time is found in the records of commercial fishermen who are required to report any game fish that they take and subsequently release. Their records reveal that they captured and released no northerns in 1957, 11 in 1958, 16 in 1959, 33 in 1960, and 32 in 1961.

From this information, it appears then that while the northern pike population became firmly established in the reservoir during these years, they were not thick enough to significantly begin to enter the sport fishing catch.

**Arthur Rognuss and Gene Denault with a catch from the big pond during October, 1965. Two fish on the right probably represent the 1964 year class; second from left the 1963 class and the lunker probably dates back to the late '50's.**

In July of 1960, the second severe draw down of the reservoir began. This lowered the water level 27 feet by March of 1962 and apparently set the stage for the establishment of the big northern pike population currently supporting the major part of the sport fishery. By August of 1963, the reservoir had recovered 25 feet and during the spring of that year northerns enjoyed excellent reproductive success. By September of 1964, the reservoir was up an additional 20 feet and the northerns enjoyed a second good year. By July of 1956, the reservoir attained record water levels rising another 10 feet since September of 1964, and predictably the northerns had another good year.

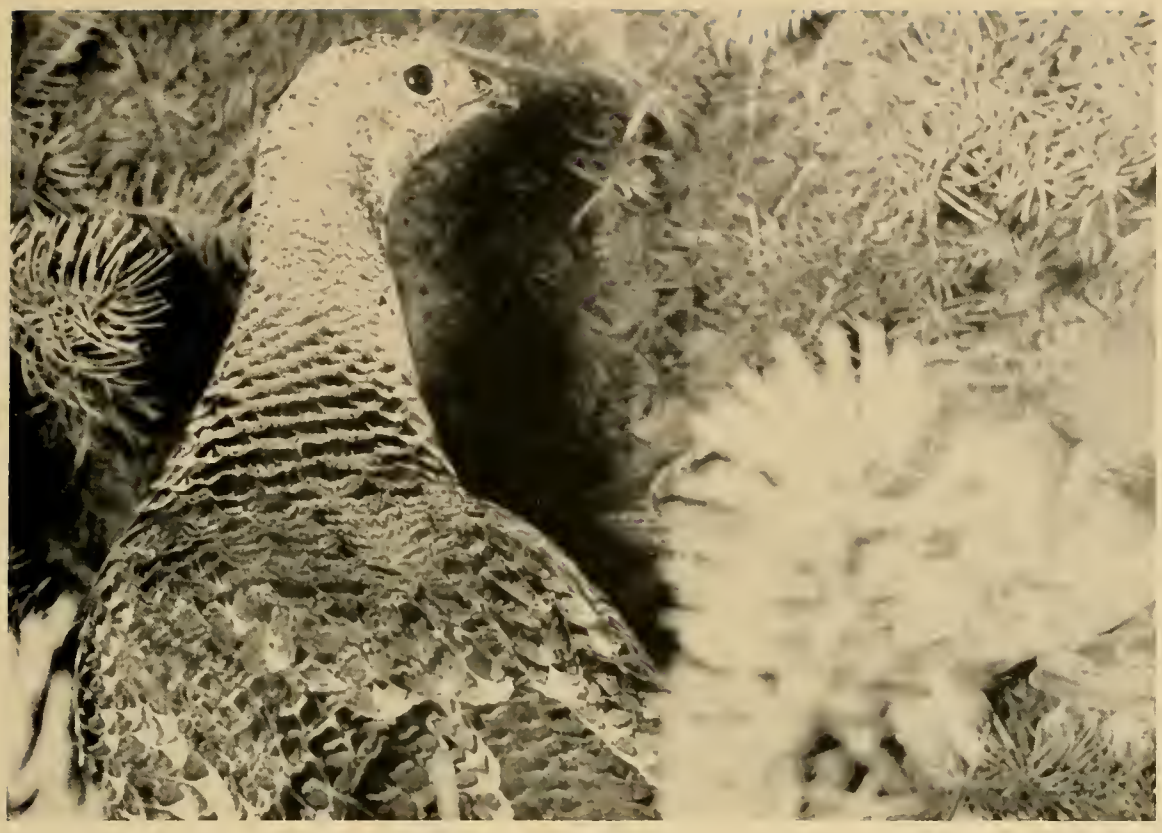
In addition to the northern pike, numerous other fish species also enjoyed ex-

cellent reproductive success during these periods of rising water. As a result, the young northerns had an almost unlimited supply of forage, enabling them to survive and grow rapidly. In fact, these fish grew so rapidly that the northerns produced in 1963 were beginning to enter the sport catch at the end of their first year of life, and northerns produced in subsequent years seem to be doing well.

Since its impoundment, Fort Peck Reservoir has been sampled by fisheries biologists in 1949, 1953, 1957, 1964 and 1965. In the samples taken during the first three gill netting efforts not a single northern pike was captured; in the last two gill netting efforts 62 northern pike were captured. During the inventory work of 1965, numerous attempts to collect young-of-the-year fish were made with a beach seine in order to more accurately assess the current year's reproduction. In one such sampling conducted during October of 1965, the take of young-of-the-year northern pike averaged one such fish for approximately every 30 feet of shoreline sampled. The objectives of our work are to document the events currently taking place in the reservoir as accurately as possible and determine how long a strong year class of northern pike will support a sport fishery. Then we will be in a position to ask for water level fluctuations that will assist northern pike in maintaining a fishable population.

The fishing outlook for the immediate future on Fort Peck Reservoir is probably brighter than it has ever been. With an excellent population of northern pike already in the sport fishery composed primarily of fish produced in the springs of 1963 and 1964, and those produced in 1965 ready to back them up, anglers have much to look forward to. It is no doubt safe to say that Fort Peck will certainly be one of the hottest pike spots in the west for at least several years to come. Our experience through this first year has been that fishing will be best early in the spring from the time the ice goes out until the spawning is done and the water warms. During this time, usually the months of April and May, most of the pike are in the shallow bay areas and readily available to the anglers. During the warm months of summer the fishing slows down but again in the fall, when the water begins to cool, the fishing picks up and remains excellent until freeze up and good thereafter for the hardy winter fishermen.

At the present time, most of the angling has been concentrated at the points of road access, namely the areas of the Dam, Rock Creek State Park, and Hell Creek State Park. This means that of the 1,600 miles of shoreline only an insignificantly small part of the reservoir is being fished. To the serious fisherman who wants to get away from the crowd, the hundreds of bays and thousands of small coves of this giant reservoir offer unlimited opportunity to fish new and different areas with the opportunity to toss his lure at northern pike that have yet to be tempted.



# *THE BIG BLUE GROUSE*

By KEITH SEABURG

The blue grouse has a number of aliases. Dusky grouse, gray grouse, fool grouse, mountain grouse and sooty grouse are but a few names which are known locally. In Montana the name "blue grouse" rings a bell with most hunters.

As an adult it is a large bird, often reaching three and one half pounds. It is interesting to read descriptions early settlers and naturalists gave to this bird. Mr. T. M. Trippe in 1874 said, "In its nature, in short, it is the exact counterpart of the ruffed grouse, having the same roving, restless disposition." Mrs. Florence M. Bailey in 1928 said, "In the depths of the coniferous forest you may suddenly discover a dusky grouse with its small pointed head and hen-like body sitting quietly on a log facing you, as if secure in its disguise — a dusky bird in the dusky woods surrounded by shadowy tree trunks." Roger Tory Peterson describes the blue grouse—"a dusky or blackish grouse. Males at close range may show a yellow or orange comb above the eye. Females are gray-brown barred with black."

Blue grouse vary in color and in the presence or absence of a light band on the tip of the tail feathers, depending upon the geographic distribution. Including all of the different varieties, blue grouse are found in the mountain regions of the west from the southern Yukon to Arizona, New Mexico and the coastal areas of California.

The blue grouse is a bird of the mountains. W. Leon Dawson said in 1909, "Indeed the blue grouse and the Douglas fir are nearly inseparable — from its command- elevation he most frequently sends forth his challenges of the spring time and

in its somber depths he hides himself throughout the winter season." During the winter months the blue grouse are found on the high elevations up to timberline. At this time the blues live in the conifers such as fir, larch and pine, doing quite well on their diet of needles and a few pine seeds. They stay in good condition in the winter on this diet, but early explorers found the flesh at this time to taste quite bitter.

As the snow begins to melt on the slopes in late March the male blues begin migrating to the lower open slopes at 4,000 feet or so where they begin the elaborate, vocal and visual, courtship displays. The male blue grouse is amazing in its return to almost exactly the same territory (within the same acre) each year. The male begins to display for the female, trying to convince her that he represents the finest baritone in the land, as well as sartorial elegance. More than likely the female gives more than passing consideration to the general layout of the home site which he has picked. The vocal display, or hooting, has been described by some individuals as reminiscent of the sound of clothes rubbed on a wet washboard. Others say it sounds like the hollow tone produced by blowing across the lip of a gallon jug.

By mid-April the females have made their patient way to the grassy footlands where the males have established their territories. The females do not return to exactly the same location each year with the preciseness of the males. The female's return is usually within a several hundred acre area. In drought years, when habitat has changed, the female may travel twice as far from her usual nesting area. After a week or so of witnessing the displays by the males the females realize all is not sweetness and light and they begin constructing their nests, lay eggs and incubate. It has been found by Thomas Mussehl of the Montana Fish and Game Department and by other workers that the vegetation type in these brood areas must be of a precise nature. The female will not nest if the vegetation does not meet the following specifications: it must contain a **mixture** of grasses and forbs, the height of the grasses and forbs must be about seven to eight inches high. Low shrubs must not make up more than 30 percent of the total canopy cover. In most of the nesting areas in Montana a mixture of bunch grasses and arrowhead balsamroot is most common. Grasses cover 35-50 percent of the ground, and forbs, such as arrowhead cover 60-70 percent of the ground. In other areas of the blue grouse range the vegetation is of a different kind, but the function is quite similar. For instance, in Alberta the arrowhead balsamroot is not present but an abundance of lupine takes its place. Along the Pacific coast the bracken fern admirably takes the place of the balsamroot. Oddly enough the height of the plants and density of cover is nearly the same as found in Musshel's studies.

The clutch of six to ten eggs which were laid in May begin hatching in mid-June. The first two weeks are critical ones in the infant blue grouse's life. In Canada it was noted that if considerable rain fell during the first fourteen days of the grouse's life, fewer chicks survived. It is not until about the fifth week that feathers develop adequately to protect them from most climatic conditions. During the first three weeks or so, insects are an essential part of the diet of the young. Rapid growth and development at this time demand that the food be high in protein. Insects are the only food source which contain amounts of protein high enough to supply these demands. It is at this time when the female's choice of vegetation cover demonstrates its importance. The mixture of grasses and broad leaf forms offer maximum production of varied insects and protection from inclement weather.

### Summer and Fall Migration

In early July the adult male blue grouse begin migrating upward. By late August they have returned to their winter range of the Douglas fir, ponderosa pine and larch high on the mountain ridges.

The upward migration of the females and their broods begins later. By mid-August they are on their upward movement. At this time the young are well feathered, of nearly adult height and less dependent on the insect diet. The timing of the brood migration is somewhat influenced by climatic conditions. Drought conditions bring on an earlier migration than in normal years. Berries which ripen later on the higher slopes form a considerable part of the food on the upward migration.

### Population Ups and Downs

The blue grouse is a long-lived bird compared to pheasant and quail. Banded male grouse have been seen returning to the same breeding site year after year. Despite the comparatively long life, approximately 35 percent of the adult birds die each year. Only about one half of the chicks which hatch each year live till fall and most of the loss is in the first four weeks after hatching. The populations which are present in the fall depend to a large extent on the success of hatching and survival of young during the current spring and summer. Given good hatching and growing conditions, the fall population may be three to four times the number found in late winter. The amount and quality of vegetation cover dictate the general level that grouse populations can achieve, but the effects of weather are more important than any other factor in the year to year variations in population numbers. It is felt by some workers that an early spring, with rapid development of vegetation, results in high fall populations.

It is interesting to note how each bird, mammal or fish compensates in various ways to maintain its population levels. For example, only 80 percent of the bobwhite quail which are alive one fall are alive the following fall. To compensate they lay 14-16 eggs per nest and the male will tend the nest if the female is lost. Renesting is common. The blue grouse with its lower mortality rate lays fewer eggs, the male doesn't supply any parental help, and the female renests if her first nest is destroyed. In mammals, mice are short-lived and produce many young, elk are long-lived and produce fewer offspring. In this same vein, birds which are short-lived vary tremendously in numbers from year to year. Populations of longer lived birds such as the blue grouse are not generally as variable.

### Hunting of the Blues

In most years the blue grouse have migrated to the high country by the time the hunting season begins. Old time hunters summarize the many faces of the blue grouse as a sporting bird. Edweyn Sandys in 1904 said, "In its native woods the light is baffling and there is a confusion of shade amid which the general slaty tone of the plumage is barely distinguishable. —the bird seems perfectly aware of this (camouflage.) Indeed its habit of trusting to its trick of treeing and remaining motionless has earned for it the name of 'fool grouse'—. These unquestionably will tree and foolishly maintain their position while their comrades are being shot or clubbed down, but the older birds, except in seldom disturbed localities, are wiser. Fool grouse or no, when once the bird concludes to start there is no more foolishness. With a nerve shaking whirring it promptly gets to top speed, and usually starts downhill, a maneuver which greatly adds to the difficulty of the shot. Let the tenderfoot climb the steeps and try a few blue grouse as they leave the trees, and his song may take on an undertone suggestive of blasted hopes and trust betrayed. In the first place, the cover usually is standing timber big enough to stop a locomotive, to say nothing of small shot."

At the present time these grouse are considerably wiser than in Edweyn Sandys day. More constant exposure to humans along the many mountain roads has made them more "ring-wise." But occasionally one still may find a dumb brood.

It is well known that the sport of grouse

hunting is not for the weak of heart. The nerve shattering explosive takeoff of the blue grouse is enough to unhinge the strongest. It is especially upsetting when still hunting the big game to have a grouse explode from under one's feet.

The most common method of hunting the blue grouse is searching for them from a road. This is productive when population levels are high. The real sport is walking the high ridges, trying to hit them as they dart through the trees.

Sporty or not, Montana grouse hunters have taken between 29,000 and 59,000 blue grouse annually between 1958 and 1962. In 1962 about 75,000 bird hunters took 487,000 birds and 38 percent of the birds were blue grouse.

The percent of the blue grouse populations taken by hunters varies from year to year. Blues have been banded in the Bridgers, Judiths and Bitterroot mountains. In the six years of banding the percent of bands returned by hunters ranges from two to twelve percent and the average is seven percent. Contrary to popular notion as the grouse population increases the hunters take a higher percentage of the population than when the population is lower. Considering the rate of harvest of branded birds, it must be concluded that the hunters' take is too small to have any effect on the number of grouse from year to year. It is interesting to note that in Alberta where hunting pressure is extremely low, blue grouse numbers have been decreasing in the last ten years.

### The Future—More or Less Grouse

During the winter months the blues spend most of their time in conifer trees. Vast mountain ranges with their extensive stands of conifer trees seem to provide all of the requisites for winter existence. Accumulation and location of droppings suggest that a grouse may spend as much as a week on the same limb. Studies of winter food habits indicate the conifer needles comprise 98 percent of their winter food. Their condition in the spring is usually excellent, so the needle diet suffices. Barring extensive logging or fire on the high ridge tops, the blues' winter haven seems secure against the inroads of man.

The summer habitat and most importantly the brood areas are well within the private and public lands which are used for logging, grazing and recreation. It is in these areas where man can influence the production of blue grouse.

To some extent logging and fires on suitable sites are responsible for much of the good blue grouse nesting sites. If these logging or fire areas are on southerly exposures at about 4,000 to 5,000 feet then the area is more likely to develop into good brood range. Other sites which rapidly grow up to a preponderance of shrubs and conifers are of limited and temporary value.

In the Bridger mountains Mussehl found that the graizng use of the brood range varied from light to heavy grazing. It was noted that the deteriorated areas which had the heaviest grazing use received little use by broods of blue grouse. The effects of heavy grazing are manyfold. In the first place the overall height of the vegetative cover is reduced by cattle grazing below the optimum of 7-8 inches. Sheep on these ranges reduce the amount of forbs, such as the large leafed arrowhead balsamroot because sheep select these types of vegetation. Loss of forbs reduces the effective canopy and makes the young chicks more vulnerable to inclement weather. The overall reductions probably also result in a lower insect population which is so vital to the young. If the grasses, deteriorated under heavy grazing, are replaced by reseeding, the end result is unsatisfactory for blue grouse because the mixture of grass and forbs is not in proper balance.

Another effect of long term overgrazing is the reduction in humus or organic matter. In the Judith mountains the physical features of the ground cover were measured inside an ungrazed fenced 25 acre

exclosure and compared with the grazed portions outside. The total vegetative cover of grasses and forbs was 103 percent in the ungrazed as compared with 62 percent in the grazed area. The amount of litter (humus or decomposing organic matter) was 24 percent in the ungrazed and 15 percent in the grazed. Twenty-six percent of the grazed area was bare ground compared with one percent in the ungrazed. This change in and out of the exclosure took place in but **one year.** In areas not receiving heavy grazing, the ground litter will hold considerably more moisture and make the area less susceptible to drought.

Many forested areas in the summer and winter ranges have been sprayed for the control of forest insects. For the most part, sprays used prior to 1954 were DDT, a persistent hydrocarbon on mammals, birds and fish under controlled laboratory conditions. In 1963 a blue grouse study project was modified to include a study on the side effects of a spruce budworm control program in the Bitterroot Mountains. This study was conducted by Tom Mussehl, of the Montana Fish and Game Department. It has been shown that build-up of DDT in many forms of life affect the reproductive rate, inhibit nerve reactions and affect ability to withstand stress. An additional factor of considerable importance is that these chemicals, such as DDT, are called broad spectrum insecticides which kill almost equally well all kinds of insects. It was felt that any significant reduction of insect numbers at the time the blue grouse chicks are one to two weeks old could result in losses of chicks through malnutrition.

Mussehl found that there was a considerable accumulation of DDT in most of the vegetation and in the grouse themselves. Female grouse captured up to 50 days after spraying contained from 1.6-109 parts per million of DDT in their fat. Male grouse contained 7.8 to 80 parts per million of DDT in the same period. Nearly a year after spraying, some grouse still stored up to 100 parts per million of DDT in their fatty tissues. The needles from Douglas fir trees were found to contain about 3-11 parts per million of DDT 124 days after spraying.

DDT has not been used as an insecticide for forest spraying in Montana since 1963. DDT residues are still found in grouse in the Bitterroot area but at reduced levels.

It was found that there was a general reduction in insect numbers after the areas were sprayed. This was at a time when blue grouse chicks were four weeks or older. The grasshoppers, which were not significantly affected by the spraying, comprised 70 percent of the chicks' diet. The depletion of other insects would have its maximum effect on the very young birds.

In the summer of 1965 several new nonpersistent chemicals were used to experimentally spray selected areas in the Bitterroot. While these chemicals have been demonstrated as toxic to mammals, the concentration of the chemical as used in spraying is below the level which would poison the birds and animals. Continuing studies are being made to measure the effects of forest insect control and, hopefully, chemicals will be found which will affect only the specific insect on which control is wished.

The future of blue grouse in Montana is certainly a lot brighter than that of other game birds. Continual losses of pheasant habitat because of increased and changing agricultural practices and urbanization of mountain valleys are shrinking the ringnecks' range. Sagebrush control, if extensively practiced, will reduce sage grouse populations severely. But the blue grouse, which is so admirably suited to the mountains of the west will continue to prosper if its summer ranges are not deteriorated through overgrazing.

# The International Antelope Herd

By CLIFF MARTINKA, Management Biologist

The severe, record breaking winter of 1964-65 concentrated thousands of pronghorn antelope along the Milk River in northern Montana. The situation gained national recognition when deep snows forced many antelope into residential areas of Glasgow and Havre. While townspeople were busy protecting their ornamental shrubs, farmers and ranchers were busy keeping hungry antelope from their haystacks. Hundreds of antelope starved or were killed by trains.

Records of the Montana Fish and Game Department show that similar situations have occurred at least six other times during the past twenty years. Although losses were not as great during winters previous to 1964-65, indications are that the problem is more or less chronic and may be expected again. A better understanding of the complexities of the problem has been gained through research studies conducted in Montana since 1958. The results have yielded valuable information concerning summer distribution, migration patterns and winter mortality of these northern Montana antelope herds.

### Summer Distribution

Summer distribution of antelope which wintered along the Milk River near Glasgow and Malta was determined from hunter returns of ear tags from marked animals. Antelope were tagged on winter concentration areas where they were herded into corral-like traps with an airplane. Each animal received a numbered metal ear tag. Of 173 antelope marked near Glasgow in December 1958, hunters returned 25 tags from 1959 through 1963. Thirteen tags were returned from 1960 through 1962 from 140 antelope marked near Malta in November 1959.

The two herds occupied separate and distinct summer ranges. Antelope from both herds summered in Saskatchewan, Canada, but in different proportions. Sixty four percent of the tag recoveries from the Glasgow herd were from Canada compared to only 23 percent from the Malta herd. Both summer ranges were vast in relation to the relatively small wintering areas.

Movements of these antelope are among the most extensive ever recorded. The maximum distances between points of tagging and recovery were 100 and 88 miles from the Malta and Glasgow trap sites, respectively. The average distance for all recoveries was about 42 miles from the trapping sites. In a Chouteau county study, Cole and Wilkins in 1958 reported seasonal movements which are probably more typical of Montana antelope. Their results showed movement of 10 to 23 miles between summer and winter ranges.

The overall tag recovery for both herds was only 12 percent of all animals marked, suggesting a relatively light harvest by hunters if most tags were returned. In most Montana herds 20 to 35 percent of the animals are harvested each year by hunters. The low tag return may also have reflected loss of marked antelope from other causes. Several marked animals were known to have died of malnutrition on the winter range.

### Migration

Movement to wintering areas appeared to be precipitated by snow rather than cold weather. Migration intensity and numbers observed on the four major winter ranges were relatively greater during years of heaviest snows. During years of light snowfall only limited concentrations appeared in the vicinity of the Canadian border. Aerial and ground observations during migration periods disclosed that antelope habitually used mi-

**The severe winter of 1964-65 was reflected in lower fawn production during the spring of 1965.**

gration pathways along major drainages. These drainages provided both food and shelter during migration.

### Winter Mortality

The winter of 1964-65 was the most severe on record for the northern tier of Montana counties. Snow reached 15 to 40 inches deep and frequent winds of 10 to 25 miles per hour caused considerable drifting. Near Glasgow, where below zero temperatures were recorded on 78 days, approximately 500 antelope were known to have died of natural causes. Several hundred additional animals were killed along railroads which were used by antelope as paths of travel and as resting areas. The situation provided an opportunity to study the causes and characteristics of antelope winter mortality.

Most losses from natural causes were directly attributable to malnutrition. Examination of the leg bone marrow of 59 carcasses revealed that 97 percent were in a gelatinous condition, a certain indicator of malnutrition. Bone marrow from healthy animals has a white waxy appearance due to the high fat content.

Information on mortality patterns was provided by sex and age determination of 327 carcasses. Tooth replacement pattern and wear were the basis for assigning an age to each carcass. Sex ratios of carcasses (number of males per female) were compared with sex ratios observed in 1964 summer range aerial classifications of antelope associated with the Glasgow winter range. Carcass sex ratios for fawns were compared with ratios determined from hunter check stations and fawn tagging information.

Males and females exhibited different rates of mortality in the fawn, young adult (1½-3½ years) and old adult (4½ plus years) age groups. Among fawns, the carcass ratio was similar to that expected among live antelope suggesting that both sexes were equally susceptible to starvation. Young adult males appeared to have more stamina than females of the same age since their proportion among carcasses was less than that observed on the summer range. However, the proportion of males in older age carcasses was considerably greater than expected, suggesting that they were quite vulnerable to the harsh winter. These older bucks probably entered the winter in relatively poor condition since they had little opportunity to recover from the rigors of the breeding season.

Certain trends were also indicated in the mortality rate of different aged antelope. There appeared to be excessive losses among fawns while the proportion of yearlings among carcasses was close to that expected. Two-and-one-half year olds definitely showed a low mortality rate whereas the mortality rate increased for animals three years and older. Studies of deer and elk indicate that fawns, yearlings and older animals are generally the most susceptible to starvation.

### Winter Food Habits

Antelope starvation diet was studied near Glasgow by examining stomach samples from 14 carcasses. The volume of recognizable items in each sample was determined by laboratory analysis.

All studies pointed to browse as the most important forage class during winter. Samples obtained from carcasses, however, contained less browse and more forbs than those of other studies. A more significant difference was shown in the kind of plants eaten. The starvation diet was characterized by creeping juniper, fringed sagewort and a variety of forbs. The other studies showed that the winter diet was dominated by silver and/or big sagebrush. Creeping juniper was important in one area of the Canadian study but the diet in that area also contained about one-third silver sagebrush. The Chouteau county study showed 23 percent waste grain and five percent sprouted grain, but the remainder of the diet was sagebrush. The starvation diet contained only one percent silver sagebrush and no big sagebrush. Grass constituted a relatively minor portion of the diet in all studies.

### Management Implications

The effects of the 1964-65 winter mortality were evident during the 1965 summer range aerial census of the Glasgow herd. Total counts showed a 62 percent antelope decrease from 1963 in Montana and a 38 percent decrease from 1964 in Saskatchewan. Two factors appeared involved in the population decline—direct loss from winter mortality, and lowered fawn production in 1965.

Numerous studies of deer and elk have shown that winter mortality is related to insufficient good quality forage. Only limited information is available concerning antelope winter range requirements. Most winter food habits studies have indicated that shrubby plants, especially sagebrush, are the important winter forage for antelope. This study showed only one percent silver sagebrush in the diet of starved antelope although most rumens examined were full of other plants. This information suggests that starvation may have been related to insufficient shrubby sagebrush in the diet. Only minor losses occured on winter ranges near Malta where silver and big sagebrush were available and heavily utilized.

Fawn production in 1965 also appeared related to winter range quality. Summer range aerial classification showed that the Glasgow herd produced only 39 and 55 fawns per 100 does in Montana and Saskatchewan, respectively. Normally, 90 to 110 fawns per 100 does are expected. Antelope associated with the Malta herd had normal production of 90 fawns per 100 does.

Future management of antelope in northern Montana will, of necessity, involve a consideration of winter range carrying capacity. However, more information is needed on winter range relationships in order to establish specific management criteria for each of the four major wintering herds. Studies are also needed to determine the summer ranges of the Havre and Chinook herds and the relative proportions of antelope summering in Canada and Montana for all herds. As this information becomes available, it will be possible to manage each herd as a unit. Reduction or elimination of winter loss and agricultural depredation would be effected by adjustments in harvest quotas to maintain each herd within its winter range carrying capacity.

**Brook trout. Note the identifying characteristics: wavy lines (vermiculations) on the back; pigmented adipose fin (stubby fin on the back forward of the tail); and white leading edges on the lower fins.**

# The Ten Pound Brook Trout Limit

Montana fishermen may legally take up to ten pounds of brook trout in addition to other limits of game fish. The reasons for the more liberal limit on these fish are tied to the pecularities of the species, their spawning habits and general body makeup and processes that are lumped under the term physiology.

The brook trout is not native to Montana. It was brought in from eastern states during the early days of railroading and distributed widely. Almost every stream straddled by a trestle was given a liberal sprinkling with "brookies." They are a good fish in numerous lowland streams, lakes and ponds where they attain a nice size. However, many small, cold headwater lakes and streams are overstocked with brookies, most of which are less than seven inches long. Here they have proven an undesirable introduction, for they have taken the place of other less prolific game fish which would grow larger.

The problem with brook trout eventually boils down to their spawning habits and the life processes that make them tick. They spawn in the fall, and at a more tender age than other trout. Many females mature as yearlings. Males less than a year old have been found ripe with milt. Both sexes may mature and be capable of spawning when only four inches long.

As a result, where there are good spawning conditions there are large populations of brook trout. Crowding means slow growth. Then too, brook trout are short-lived, particularly in small streams. There, individuals over four years old are very rare.

The end result is that in many areas there are large populations of brook trout which never live long enough to attain any size. Coupled with competition among themselves and with other fish species the brookies are "pan-sized" in most Montana

streams and many high lakes. The best sized ones can be expected where competition is at a minimum and where natural factors do not allow them to near their natural reproductive potential.

There are other game fish in Montana which also spawn in the fall, but they differ in many ways from brook trout. Brown trout, for example. are older when they mature and spawn. They are not, therefore, as prolific as the brook trout. Brown trout are better able to survive the winters after spawning, not because they are older, but also because they are different physiologically.

For several years a limit on brook trout comparable to the new ten pound limit has been tried in south central Montana lakes, also in lakes of Mineral county and in several lakes west of Deer Lodge. Where brook trout are nice sized, the poundage limit will keep the legal number of fish similar to what it has been in the past. Where brook trout are numerous and stunted the separate limit has allowed anglers to enjoy additional sport without harming the resource. With enough fishing pressure it may eventually help the growth rate of brook trout in these areas. They reproduce so rapidly and have such a high natural mortality rate that fishermen can be allowed to take goodly numbers of them without fear that they will be fished out.

The brook trout is a very beautiful game fish and can be quite easily distinguished from all other fish in Montana with one exception. The exception is the Dolly Varden or bull trout which is found west of the Continental Divide.

The distinguishing characteristic of the brook trout is the color of the lower fins. The leading edges of the lower fins are white with a black strip immediately behind the white edge. Red spots surrounded by bluish rings are sprinkled over their sides. The backs of brook trout are marked with dark, wavy lines often referred to as vermiculations or worm tracks. Spawning males may have orange on the belly and black on the olwer sides.

Lower fins of Dolly Varden (bull trout) look much like those of the brook trout. They have pale outer edges with darker stripes adjoining them. They tend to have bright orange or red spots on their sides. In lakes the spotting is often yellow and only appears on the backs of the fish. One can distinguish brook trout from Dolly Varden by looking at the backs of the fish. Whereas, the backs of Dolly Varden are spotted, the backs of brook trout are not spotted but show the characteristic vermiculations described above. The small stubby fin on the backs, just forward of the tail, is pigmented on the brook trout but is not pigmented on the Dolly Varden.

Rainbow and brown trout are the other trout most commonly caught. Color of rainbow trout will vary greatly, depending upon their ages, water depths in which they live, temperatures of water and general genetic line. Generally, they are a base bluish or olive color on the upper parts. This shades into a silvery or silvery green on the sides. The dorsal fin (big fin on the back), tail and sides are sprinkled with small dark spots. A characteristic broad band of pink or red runs along the sides from head to tail. Rainbow will often cross with cutthroat trout and the crosses may have characteristics of both fish, including a colored band down the sides and a pink or red slash on either side of the lower jaw.

The color of brown trout also varies widely. In general, its color on top and on the upper sides is a dark brown to olive brown. The lower sides become lighter, sometimes almost yellowish. Their backs are heavily marked with black or brown and red spots. The red spots on the sides are often surrounded with light rings.

RETURN REQUESTED

Return To
INFORMATION-EDUCATION DIVISION
MONTANA FISH & GAME DEPARTMENT
Helena, Montana
ZIP 59601

Sec. 34.66, P. L. & R.
U. S. POSTAGE
**PAID**
Permit No. 50
Helena, Montana

TRIBUNE PRINTING